

Reducing Emissions from Deforestation: A Key Opportunity for Attaining Multiple Benefits

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Abstract

This paper reviews the potential for multiple benefits that might be attained by reducing emissions from deforestation (RED) through a mechanism developed under the UNFCCC. These benefits are relevant to national commitments under several environmental and sustainable development conventions and instruments, and may not be directly correlated with reduced carbon emissions. The design of the mechanism and its implementation will affect the degree to which these other benefits, such as biodiversity conservation, livelihoods, watershed protection and other ecosystem goods and services, are obtained.

Introduction

The UNFCCC discussions on reducing emissions from deforestation in developing countries result from recognition of the key role that forests play in the global carbon cycle and of the major contribution to global carbon dioxide (CO₂) emissions made by deforestation, especially in the tropics.

Forests account for almost half of the global terrestrial carbon pool. The total carbon content of forest ecosystems in 2005 was estimated at 638 Gt, including stores in biomass, soils and dead wood (FAO 2006a). Tropical forests play a particularly important role in the global carbon budget (Melillo *et al.* 1993; Dixon *et al.* 1994; Schimel *et al.* 2001, Houghton 2005) because of the large amount of carbon stored in their biomass. Depending on the method of forest removal and the subsequent use of the felled trees and the land, deforestation not only releases the carbon stored in the above ground biomass, but leads to decomposition of root mass and mobilization of soil carbon. Global carbon emissions (CO₂ and other greenhouse gases) from changes in land use, including tropical deforestation are estimated to be between 18% (Stern 2006, IPCC 2007) and 25% of annual global emissions from all sources (Santilli *et al.* 2005).

Therefore, discussions are underway to consider policy mechanisms and incentives to effect reductions in this important source of emissions. Reducing emissions from deforestation (RED) is distinct from carbon sequestration, which aims to immobilise CO₂ from the atmosphere and thus concerns sinks rather than sources of emissions. While details of RED mechanisms have yet to be worked out, it is clear that they will have to focus on the avoidance or reduction of CO₂ emissions rather than on deforestation *per se*. Thus, one currency in which they must be considered is tonnes of CO₂ as distinct from hectares of forest. There is no simple linear relationship between these two sets of units because forests and other ecosystems vary in both the amount of carbon per hectare they store in their biomass (carbon density) and the carbon immobilised in other compartments of the ecosystem, such as the soils (FAO 2006a). Therefore, there is no clear correlation between net loss of forest cover and the quantity of CO₂ emitted through deforestation. Furthermore, the degree to which deforestation releases stored CO₂ from biomass and other ecosystem compartments

depends on the methods used for deforestation (e.g. whether fire is involved) and the land use in the newly converted forest areas. For example, in the peat swamp forests of Southeast Asia, deforestation, fire and drainage are estimated to generate at least 2000 Mt CO₂ emissions annually (Hooijer *et al.* 2006).

For the current purposes of UNFCCC and the Clean Development Mechanism, forests are defined as areas larger than 0.05-1 ha having greater than 10-30% crown cover of trees that are 2-4 m or more in height (each Party selects an appropriate definition from the specified range). Emissions resulting from deforestation are therefore those emissions resulting from a reduction in the area that meets this definition. It is important to recognise, however, that large carbon emissions can be generated from forests by tree removal and other degradation processes that do not cause them to pass the definition thresholds (Mollicone *et al.* 2007). Discussions around RED also include whether emissions from forest degradation should be included in the mechanism. Many such issues remain to be clarified to ensure that the objectives and modalities of RED developments are clear and unambiguous.

Once definitions and other issues are resolved, an effective mechanism to advance RED will provide an unprecedented opportunity to reap multiple environmental and other benefits at global, national and local scales. Despite their basic focus on carbon, RED efforts under the UNFCCC have strong potential to contribute towards the goals of many other multilateral environmental agreements and mechanisms and to help national governments to meet their obligations under these instruments, as well as to help assure the continued provision of vital ecosystem services by forests and to enhance livelihoods. This paper highlights the relevant policy goals and commitments, as well as the ecosystem services most likely to be affected by RED efforts. It identifies considerations and tools for addressing these that could increase the efficacy of RED efforts for meeting multiple environmental objectives. This paper focuses on RED only in relation to deforestation; reducing forest degradation would increase still further the potential for multiple benefits.

Multiple Benefits: Multilateral Environmental Agreements and Processes

Many multilateral environmental agreements and processes have objectives that are directly and/or indirectly linked to maintenance of healthy forest ecosystems. Most explicitly recognise climate change as a major factor affecting their focal concerns, and some recognise the importance of ecosystems in general or forests in particular for carbon storage. However, outside the UNFCCC, no process focuses on carbon storage as an objective (Table 1).

In addition to the International Tropical Timber Agreement (ITTA) and the United Nations Forum on Forests (UNFF), which specifically address forest issues, global agreements whose objectives relate to forests in some way include: the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the Ramsar Convention on Wetlands of International Importance, the Convention on Migratory Species (CMS), and the World Heritage Convention. Importantly, a number of processes that are less strictly environmental in scope also include objectives or targets relating to forests. These include the Millennium Development Goals and other discussions on sustainable development, in

particular the Commission on Sustainable Development and the World Summit on Sustainable Development (WSSD).

Table 1. Multilateral agreements and processes that include forest-related objectives

<i>Instrument</i>	<i>Example forest-related objective(s)</i>
UNFCCC	Reduction in emissions resulting from deforestation
ITTA	Sustainable supply of timber
UNFF	Sustainable forest management
CBD	Conservation and sustainable use of forest biodiversity
UNCCD	Maintenance and restoration of forest cover as a means of reducing effects of desertification
Ramsar Convention	Conservation and wise use of forest wetlands
CMS	Conservation of migratory species using forest habitats
World Heritage Convention	Protection of identified forests representing heritage of outstanding universal value
MDGs	Ensuring environmental sustainability and reversing the loss of forest-related resources
CSD	Promoting the role of forests in sustainable development
WSSD	Support for the forest-related components of other instruments

International Tropical Timber Agreement

The 1994 International Tropical Timber Agreement (ITTA) had 58 signatories. The newly renegotiated 2006 version of the ITTA, which will enter into force in 2008, will potentially have 82 signatories: 45 producer and 37 consumer countries. The 2006 ITTA builds on the foundations of the previous agreements, focusing on the world tropical timber economy and the sustainable management of the resource base, simultaneously encouraging the timber trade and the improved management of forests. In addition, it contains provisions for information sharing, including non-tropical timber trade data, and allows for the consideration of non-tropical timber issues as they relate to tropical timber. A RED mechanism could provide a basis for improved management of tropical forests.

United Nations Forum on Forests

The United Nations Forum on Forests (UNFF) involves all 192 member-states of the United Nations and aims to promote "... the management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment to this end" based on the Rio Declaration, the Forest Principles, Chapter 11 of Agenda 21 and the outcome of the Intergovernmental Panel on Forests and the Intergovernmental Forum on Forests (IPF/IFF) processes, and other key milestones of international forest policy. UNFF promotes sustainable management, including forest restoration and conservation of threatened species – to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. Sustainable forest management will be fundamental to the maintenance of forest under a RED mechanism.

Convention on Biological Diversity

The CBD, which has been ratified by 189 countries and the European Community, addresses forests within its three broad objectives: Conservation of biodiversity, sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. Forests are addressed specifically and in more detail within the *Expanded Programme of Work on Forest Biological Diversity*. Much of the CBD's effort is aimed at its '2010 biodiversity target' of significantly reducing the rate of biodiversity loss by 2010. Among the indicators of progress towards this target are changes in the extent of ecosystems such as forests, the area of forest under sustainable management, and trends in ecosystem integrity and ecosystem goods and services, and specifically in the fragmentation or connectivity of forest ecosystems. All of these could be affected positively by the implementation of a RED mechanism.

UN Convention to Combat Desertification

The UN Convention to Combat Desertification, which has been ratified by 190 countries and the European Community, recognises the importance of ecosystem loss and degradation as drivers of desertification and encourages Parties to manage ecosystems sustainably and to conserve them, and especially singles out the importance of forests in this respect. It specifically recognises the concerns of low forest cover countries and supports their participation in the Tehran Process on countries with low forest cover under UNFF. Maintaining forest cover in these countries can make an important contribution to combating desertification and mitigating the effects of drought.

Ramsar Convention on Wetlands

The Ramsar Convention on Wetlands, which has 154 Contracting Parties, promotes the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world. According to its definitions, wetlands include many types of forests such as mangroves, riverine forests, bog and swamp forests. The operational objectives of the Convention recognise the importance of land use planning and catchment and river basin management in maintaining the ecological character of Ramsar sites and other wetlands. Maintaining forest cover is a fundamental part of catchment management and maintaining healthy wetlands.

Convention on Migratory Species

The Convention on Migratory Species (CMS), which has 101 Parties, urges Parties to take action to conserve and manage effectively key sites and habitats to improve the conservation status of migratory species of conservation concern and, where appropriate, to connect these sites through networks of protected areas and corridors. A number of the species listed in the CMS appendices are forest species whose habitats might be conserved and managed under a RED mechanism.

World Heritage Convention

The World Heritage Convention, bringing together 183 State Parties, is concerned with the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage of outstanding universal value. State Parties are required to take the appropriate legal, scientific, technical, administrative and financial measures in this regard. The World Heritage List of

cultural and natural heritage comprises 162 natural and 24 mixed cultural and natural properties, many of which are forests. Any RED mechanism would potentially support the protection and conservation of those forest properties.

Millennium Development Goals

The Millennium Development Goals (MDGs) explicitly recognise the importance of forests for human well being and livelihoods through the inclusion of indicators on forests and biodiversity under goal 7 on environmental sustainability (ensure environmental sustainability), target 9 (Integrate the principles of sustainable development into country policies and programmes and reverse the losses of environmental resources). Benefits for human livelihoods can potentially be achieved through implementation of a RED mechanism that works within the framework set by the MDGs.

Commission on Sustainable Development

The United Nations Commission on Sustainable Development (CSD) was established by the UN General Assembly in December 1992 to ensure effective follow-up of the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit. The CSD is the high-level forum for sustainable development within the United Nations system. At its fifth session, in 1997, CSD considered forests as a sectoral focus. The meeting recognised the importance of forests for sustainable development, and called for political commitment to encourage and facilitate the intergovernmental policy dialogue on forests. It also called for implementation of national forest programmes and enhanced international cooperation. Forests are part of the thematic cluster for the 2012/2013 session of the CSD. Development of a RED mechanism that can contribute to sustainable development would advance the mission of the CSD.

World Summit on Sustainable Development

In 2002, the World Summit on Sustainable Development (WSSD) adopted the Johannesburg Plan of Implementation. The Plan recognises that sustainable forest management is essential to achieving sustainable development and urges actions to enhance political commitment for sustainable forest management; support UNFF; take action on domestic forest law enforcement; achieve sustainable timber harvesting; address the needs of those parts of the world that suffer the highest deforestation rates; create and strengthen cooperation to facilitate the provision of increased financial resources, technology transfer and capacity-building; accelerate implementation of the proposals for action of IPF/IFF; support indigenous and community-based forest management systems; and implement the CBD expanded programme of work on forest biodiversity. Both, the forest-related calls from the CSD and the commitments of the WSSD Plan of Implementation could become integral parts of a RED mechanism. A RED mechanism that recognises and promotes the livelihoods benefits of forests will contribute to meeting the goals of these processes.

Mechanisms to support collaboration among processes

At present, at least two key mechanisms exist to support collaboration among processes and promote consistency among their approaches:

- The **Joint Liaison Group** (JLG) comprising CBD, UNCCD and UNFCCC, established as an informal forum for exchanging information, exploring opportunities for synergistic activities and increasing coordination. The JLG

comprises the officers of the Conventions' scientific subsidiary bodies, the Executive Secretaries, and members of the secretariats.

- The ***Collaborative Partnership on Forests***, which comprises 14 major forest-related international organizations, institutions and convention secretariats. The objectives of the Collaborative Partnership on Forests are to support the work of UNFF and member countries, and to enhance cooperation and coordination on forest issues.

These and other mechanisms could be mobilised to contribute to development of a RED mechanism and to support countries in its implementation.

Summary

These different agreements and processes all promote forest conservation and sustainable management for slightly different reasons. None of them is strongly prescriptive in the way they define forest, but their reasons for valuing forests lead to different approaches (e.g. see the report of the FAO/IPCC expert meeting on harmonization of forest-related definitions for use by various stakeholders, UNEP/CBD/COP/6/INF/26). Thus, progress towards the goal of reducing emissions from deforestation under UNFCCC can help to meet some (although not all) of the relevant objectives of these agreements and processes, depending on the mechanism and attendant definitions that are finally agreed for RED. Similarly, many of the actions being taken under these agreements and processes already limit deforestation and have the potential to contribute to RED.

Multiple Benefits: Ecosystem Services

As recognised by many of the above agreements and processes, and detailed in the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005), forests are important providers of essential ecosystem services. Their crucial role in carbon storage and climate regulation is the basis for the UNFCCC discussions of RED, but other services they provide, such as housing and preserving endemic biodiversity, have similar global values. Still other forest ecosystem services such as maintaining populations of natural crop pest predators and of pollinators, water regulation, timber and food provision, and the landscape values that promote tourism, are vitally important to individual nations and to local communities. Therefore, in addition to helping countries to meet their international commitments on the environment, reducing rates of forest loss can also help them to obtain the concrete benefits provided by forests.

Where forests have been retained, the services they provide may also have strong implications for other ecosystems. Thus, for example, retaining forests in mountain catchments and around headwaters can not only help to ensure consistent water yields of high quality, it can contribute to the health of aquatic ecosystems and wetlands and their abilities to provide ecosystem services in turn. Studies show that intact forests play a key role in the health of riverine, estuarine and coastal ecosystems (Thrush *et al.* 2004), and that forest habitats support pollinator populations that increase yields within agricultural ecosystems (de Marco & Coelho 2004).

Retaining large tracts of forest not only ensures a greater area remains to provide values and services, but also potentially improves the status and resilience of the remaining forest. On the whole, forests are more robust and less vulnerable to disturbances by fire and wind when present in larger tracts. Individual forest areas can contribute to the robustness of others by providing regulating services such as modulating local climates and maintaining populations of species that are key to ecosystem function, such as pollinators and dispersers. This increased robustness adds to the ability of forests to store carbon.

On the other hand, it is important to recognise that efforts to reduce rates of deforestation can be associated with risks to ecosystem services. These are largely dependent on the drivers of land use change that are causing forest loss. For example, if the drivers of land use change (such as agricultural or urban development) are strong enough and are insufficiently addressed in efforts to retain forest cover, this land use change may be shifted to other ecosystems, such as wetlands or grasslands (i.e. 'leakage' in UNFCCC terminology).. This kind of shift would adversely affect the goods and services provided by the affected ecosystems. Thus important biodiversity may be lost from these other ecosystems, water quality may be prejudiced (in the case of wetlands), or cultural values may be lost. Furthermore, the shifts may even have implications for carbon storage if the affected ecosystems have high carbon storage capacity (e.g. peatlands) and especially if the conversion process includes fire. Carefully integrated cross-sectoral planning and decision-making can help to avoid these adverse impacts.

A further risk is that limiting deforestation may prove less effective in carbon storage terms if the forest retained proves sensitive to climate change. Increasing temperatures and altered rainfall patterns can lead both to forest ecosystem degradation and to changes in soil carbon dynamics that may mean that the reduction of emissions is smaller than initially anticipated. Monitoring and accounting tools will need to be sensitive to such processes to minimise the errors in tracking carbon emissions.

Multiple Benefits: Livelihoods

The goods and ecosystem services provided by forests underpin the livelihoods of millions of people, and especially the rural poor. Maintaining forest cover helps to maintain the supply and security of these goods and services, for which there are often no viable alternatives. Careful implementation of RED can therefore help to secure and enhance the livelihoods of vulnerable people.

Depending on the factors driving deforestation, and the approaches adopted to implement RED (such as strictly protected areas), limiting land use change and deforestation can also limit access to key forest resources. It can reduce access to land for cultivation or constrain the suitability of the land available. It may limit people's access to forest products, which can be particularly important for food security and other components of livelihoods for the poor. It may also limit traditional activities, causing cultural impacts. The livelihood implications of such actions will need to be assessed. Integrated planning can help to reduce some such impacts, and there is the potential to mitigate or minimise others, for example through benefit sharing. It will be vital to assess correctly the drivers of deforestation and plan actions accordingly.

A recent report by the World Bank (Chomitz et al. 2006) points out that land clearance by the poor is often mistakenly identified as the driver of deforestation, when other factors may be more important. Addressing the true main drivers and actors of deforestation will potentially mitigate negative impacts of RED on rural livelihoods. Supporting efforts to implement sustainable forest management, low impact logging and joint forest management and other arrangements for benefit-sharing may help to achieve a reduction of emissions of greenhouse gases and at the same time secure livelihoods of forest dependent communities.

Other considerations for attaining multiple benefits from RED

Definitions

The definitions agreed in the development of the RED mechanism under UNFCCC will influence the outcomes of RED from the perspective of multiple benefits. Land use based definitions, like those currently specified under the Marrakesh Accord, which include areas from which forest has temporarily been removed (FCCC/CP/2001/13/Add.1), will allow RED to deliver only some types of benefits. While areas designated as forest that are temporarily un-stocked do in theory retain their ability to generate forest products or store carbon (FAO 2006b), their function with respect to biodiversity or catchment protection may be severely compromised. Therefore, for these ecosystem services and the multilateral processes and agreements that address them, the actual forest cover and its condition are much more important than the land use designation. Depending on how the RED mechanism develops, it will also be important to define forest degradation and examine the carbon implications of degradation in other ecosystems with high carbon storage potential, such as peatlands.

Shared monitoring and reporting

It will be important to recognise the multiple benefits of RED via appropriate monitoring and reporting schemes at national and global scales. Reporting of such benefits may well occur under the relevant multilateral agreements, but there is as yet no mechanism for noting them within the UNFCCC. Shared monitoring and harmonisation of reporting to different international agreements can reduce the costs of documenting, and increase the profile of the multiple benefits arising from RED.

Existing voluntary schemes

A number of existing or developing voluntary emissions reduction programmes (VERs) seek to maximise non-carbon environmental benefits from carbon sequestration under the CDM. The length and perceived uncertainty of the negotiation process for adopting a RED mechanism may be disincentives for voluntary schemes. The loss of existing schemes should be avoided by considering them within the design and priorities of official national-scale RED implementation.

The accuracy of accounting carbon (and other) benefits of RED will also require attention in the light of voluntary schemes. The risk is that the carbon and other benefits from these schemes are included both within national accounts and the scheme's own reporting, double-counting their benefits.

Actions to Reduce Emissions from Deforestation

Despite these limited risks, the development of mechanisms providing new and additional resources for reducing emissions due to deforestation provides an important opportunity for achieving multiple environmental and other benefits at both national and international levels. Furthermore, with appropriate tools and support, the actions that countries take towards RED goals can also help them to meet a number of their commitments under multilateral environmental agreements and other processes.

The actions that Parties are likely to take to make progress towards RED goals fall into three broad categories. These are: (i) actions that aim to limit the drivers of deforestation, including decisions on extractive activity, infrastructure development, and agricultural expansion, as well as programmes to meet societal and livelihoods needs from other sources and sectors; (ii) protection of forests, either in formal protected areas or in community conservation areas; and (iii) implementation of sustainable forest management regimes in production forest. (These broad categories of action are equally relevant to reducing emissions from forest degradation). Each of these types of action can have multiple benefits, and decisions taken at all levels on how and where to implement them will affect the achievement and magnitude of these benefits.

It will be important to develop complementary measures in order to ensure that efforts aimed at emission reductions from deforestation do not exclusively focus on the carbon values of forests. For example, additional support for protecting high priority conservation areas would provide co-benefits for biodiversity and could overcome land-use opportunity costs. Similarly, conserving arid and semi-arid woodlands with relatively low carbon values would contribute greatly to halting desertification and land degradation, particularly in Africa.

Decision support tools for RED implementation

Key to decisions on implementing such actions is strategic analysis of the opportunities available for reducing emissions from deforestation, for meeting commitments under non-climate agreements and for obtaining ecosystem values and services. This analysis must take account of the facts that environmental values of forests are unevenly distributed across landscapes and that different values can be very differently distributed. For example, some relatively low stature and therefore low carbon forests are critically important for biodiversity, and forests important for regulating water flows and reducing flooding risks may or may not be in areas of high value for biodiversity conservation. A further complication is that the values assigned to ecosystem services vary depending on the scale of the decision (*e.g.* national, regional or operational). The Natural Capital Project partnership and other groups are currently developing tools that can potentially aid this kind of strategic analysis by helping to quantify and visualise the distribution, magnitude and flows of ecosystem services (Naidoo & Ricketts 2006).

Identifying opportunities for RED actions will also depend on knowledge of rates and drivers of change in forest cover and of their distribution. The feasibility of addressing particular drivers will be key to deciding policy options.

Multicriteria analysis of the services and values provided by forests and the potential benefits from land use change could provide a basis for prioritising areas for RED implementation and maximising multiple benefits (e.g. Chan *et al.* 2006). Scenario analysis incorporating economic and environmental drivers would help to consider the potential impacts of the different policy options and prioritisation identified (e.g. ten Brink *et al.* 2006).

An important component of such scenario analysis will be recognising and incorporating risks associated with RED implementation. These include economic risks at the national scale, derived from the opportunity costs associated with redirecting land use change and possible fluctuations in the value of the carbon stored. The risks at the global scale are that RED actions do not in fact reduce emissions as much as anticipated or deliver the other benefits sought in optimum ways. This may come about through 'leakage', when land use change is diverted to other ecosystems or nations. Leakage is well recognised as a concept in relation to carbon storage, but it has been less discussed with respect to other environmental values and services. It is important to recognise that leakage can occur with respect to these values, and because of differences in their spatial distributions, may differ among values. Incorporating potential leakage in both carbon emissions and other land use change impacts into policy option scenarios can help to ensure that appropriate decisions are taken.

Requirements for research and support to Parties

In addition to decision support tools, substantial research and development will be needed to ensure that the RED mechanism is as efficient and effective as possible and that Parties are supported in its implementation. Relevant areas include:

- supporting countries in accurate identification of drivers of forest loss;
- supporting countries in assessing deforestation rates and developing appropriate monitoring programmes;
- development of scenario modelling to assess the implications of different mechanisms and associated definitions in terms of potential environmental and livelihoods benefits;
- investigation of the effects of forest fragmentation and other degradation processes on the integrity and vulnerability of carbon sinks;
- modelling and helping countries to minimise leakage and its environmental impacts of 'leakage'.

Conclusion

The development of a mechanism for reducing emissions due to deforestation provides an unprecedented opportunity for achieving multiple environmental and other benefits at global, national and local scales. Including reduction of emissions due to forest degradation in such a mechanism would increase still further the potential for multiple benefits. A RED mechanism will need to recognise and promote opportunities for also achieving forest-related objectives of other instruments, retaining forest ecosystem services and enhancing livelihoods from forests. Furthermore, with appropriate tools and support, the actions that countries take towards RED goals under the UNFCCC can also help them to meet a number of their commitments under multilateral environmental agreements and other processes as

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well as to help ensure the continued provision by forests of vital ecosystem services and livelihoods. Similarly, actions taken under other MEAs should be directed at generating multiple benefits, including RED, wherever possible. Integrated cross-sectoral planning and decision-making is required to maximise the benefits and minimise risks for the maintenance of the suite of services provided by forests.

References

- ten Brink, B., Alkemade, R., Bakkenes, M., Eickhout, B., de Heer, M., Kram, T., Manders, T., van Oorschot, M., Smout, F., Clement, J., van Vuuren, D., Westhoek, H., Miles, L., Lysenko, I., Fish, L., Nellemann, C., van Meijl, H., Tabeau, A. 2006. *Cross-roads of Planet Earth's Life. Exploring means to meet the 2010-biodiversity target*. Netherlands Environmental Assessment Agency, Bilthoven.
- Chan, K.M., Shaw, R.M., Cameron, D.R., Underwood, E.C., Daily, G.C. 2006. Conservation Planning for Ecosystem Services. *PLoS Biology* 4(11):e379
- Chomitz, K, Buys, P., De Luca, G., Thomas, T.S. and Wertz-Kanounnikoff, S. 2006 *At Loggerheads? Agricultural Expansion, Poverty Reduction and Environment in Tropical Forests*. The World Bank, Washington, D.C.
- de Marco, P., Coelho, F.M. 2004. Services performed by the ecosystem: forest remnants influence agricultural cultures' pollination and production. *Biodiversity and Conservation* 13(7):1245-1255.
- Dixon, R.K., Brown, S., Houghton, R.A., Solomon, A.M., Trexier, M.C., Wisniewski, J. 1994. Carbon Pools and Flux of Global Forest Ecosystems. *Science* 263(5144):185-190.
- FAO 2006a. Global Forest Resources Assessment 2005. Progress towards sustainable forest management. *FAO Forestry Paper 147*. Food and Agriculture Organization of the United Nations, Rome, Italy.
- FAO 2006b. Definitional Issues Related to Reducing Emissions from Deforestation in Developing Countries. Draft Discussion Paper. http://unfccc.int/files/methods_and_science/lulucf/application/pdf/060830_killman_n.pdf downloaded 23 february 2007.
- FCCC/CP/2001/13/Add.1. Reoprt of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 20 October to 10 November 2001. Addendum Part 2: Action Taken by the Conference of the Parties.
- PART TWO: ACTION TAKEN BY THE CONFERENCE OF THE PARTIES
- Hooijer, A., Silvius, M., Wösten, H. & Page, S. 2006. *PEAT-CO₂, Assessment of CO₂ emissions from drained peatlands in SE Asia*. Delft Hydraulics report Q3943.
- Houghton, R.A. 2005. Tropical deforestation as a source of greenhouse gas emissions pp13-21 In P. Moutinho and S. Schwartzman (eds) *Tropical deforestation and climate change*. Amazon Institute for Environmental Research..
- IPCC 2007. *Climate Change 2007: The Physical Science Basis. Summary for Policymakers*. Intergovernmental Panel on Climate Change, Bonn.
- Melillo, J.M., McGuire, D.A., Kicklighter, D.W., Moore, B., Vorosmarty, C.J., Schloss, A.L. 1993. Global climate change and terrestrial net primary production. *Nature* 363(6426):234-240
- Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.
- Mollicone, D., Achard, F., Federici, S., Eva, H.D., Grassi, G., Belward, A., Raes, F. Seufert, G., Stibig, H.-J., Matteucci, G. and Schulze, E.-D. 2007. An incentive mechanism for reducing emissions from conversion of intact and non-intact forests. *Climatic Change* in press.
- Naidoo, R., Ricketts, T.H. 2006. Mapping the economic costs and benefits of conservation. *PLoS Biology* 4(11): e360
- Santilli, M., Moutinho, P., Schwartzman, S., Nepstad, D., Curran, L., Nobre, C. 2005. Tropical Deforestation and the Kyoto Protocol *Climatic Change* 71(3):267-276.
- Schimel, D S., House, J.I., Hibbard, K.A., Bousquet, P., Ciais, P., Peylin, P., Braswell,

- B.H., Apps, M.J., Baker, D., Bondeau, A., Canadell, J., Churkina, G., Cramer, W., Denning, A.S., Field, C.B., Friedlingstein, P., Goodale, C., Heimann, M., Houghton, R.A., Melillo, J.M., Moore, B., Murdiyarso, D., Noble, I., Pacala, S.W., Prentice, I.C., Raupach, M.R., Rayner, P.J., Scholes, R.J., Steffen, W.L., Wirth, C. 2001. Recent patterns and mechanisms of carbon exchange by terrestrial ecosystems. *Nature* 414(6860): 169-172.
- Stern, N. 2006. *The Economics of Climate Change - The Stern Review*. Cambridge University Press, Cambridge, U.K.
- Thrush, S.F., Hewitt, J.E., Cummings, V.J., Ellis, J.I., Hatton, C., Lohrer, A., Norkko, A. 2004. Muddy waters: elevating sediment input to coastal and estuarine habitats. *Frontiers in Ecology and the Environment* 2(6):299-306.
- UNEP/CBD/COP/6/INF/26. Forest biological diversity. Report on the expert meeting on harmonization of forest-related definitions for use by various stakeholders, Rome, 23-25 January 2002. <http://www.biodiv.org/doc/meetings/cop/cop-06/information/cop-06-inf-26-en.pdf>.